



# **Akribis Systems**

**Where Precision Matters**

## **Test Report for MI Equipment**

**(DGV16-AVA1-6-C40 -AVA1-C40  
With AKB3-G-WHI-10/100EE-T2)**

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**Revision:** 1.0  
**Date:** 30<sup>th</sup> March 2016

## Table of Contents

### Contents

1. Objective.....	3
2. Experiment Equipment.....	3
3. Test Bench Set Up .....	4
3.1 DG16 with 130g Load .....	4
3.2 AKB3-G-WHI-10/100EE-T2.....	4
4. Customer Specification.....	5
4.1 Loading Requirement .....	5
4.2 Driver Specification & Settings .....	5
4.3 Motor Profile Requirements.....	5
5. Test Result.....	6
5.1 Motion Results-1 .....	6
5.2 Motion Results-2 .....	7
5.3 Coil Temperature .....	7
6. Summary .....	9
7. Motor/ Module Information .....	9
7.1 DGV16 Motor Information / Data Sheet .....	9
7.2 Dimensional Drawing of DGV16 .....	10

## Table of Figures

Figure 1 DGV16 with 130g load.....	4
Figure 2 AKB3-G-WHI-10/100EE-T2 Driver for this experiment .....	4
Figure 3 Single Cycle Time.....	5
Figure 4 2.5mm with 130g load.....	6
Figure 5 4mm with 130g load .....	7
Figure 6 DGV16 Motor Information / Data Sheet .....	10
Figure 7 DGV16 Motor Information / Data Sheet .....	10

## 1. Objective

The purpose of the experiment is to evaluate the performance of DGV16-AVA1-6-C40 Voice Coil which was mounted with loading of 130g and operation requirements.

## 2. Experiment Equipment

**The following items / equipment are used in the test:**

- 1) Double Guide Voice Coil Modules DGV16-AVA1-6-C40
- 2) Mirco E M1500 Encoder – 1 $\mu$ m encoder resolution
- 3) AKB3-G-WHI-10/100EE-T2 (Position Mode Control)

### 3. Test Bench Set Up

The following picture describes the Test Bench setup.

#### 3.1 DGV16 with 130g Load



Figure 1 DGV16 with 130g load

#### 3.2 AKB3-G-WHI-10/100EE-T2



Figure 2 AKB3-G-WHI-5/100EE-T2 Driver for this experiment

## 4. Customer Specification

### 4.1 Loading Requirement

Load of 130g was mounted onto DGV16 during the experiment.

### 4.2 Driver Specification & Settings

<b>Driver used:</b>	AKB3-G-WHI-10/100EE-T2
<b>Mode of Control:</b>	Position Model Control
<b>Driver Specifications:</b>	Continuous Current = 10A
	Peak Current=20A
<b>Power Supply:</b>	Switch Mode 24VDC @10A
<b>Digital Encoder Specifications:</b>	1um/count

### 4.3 Motor Profile Requirements

Single Cycle	
Move Up 15msec	Total Time 30msec
Move Down 15msec	

*Figure 3 Single Cycle Time*

#### Single Motion Cycle Time:

<b>Travel Time:</b>	<b>15msec</b>
<b>Accuracy Requirement:</b>	<b>Position Accuracy &lt;20um</b>
<b>Linear Stroke</b>	<b>0 to 2.5mm &amp; 0 to 4mm</b>
<b>Weight of load</b>	<b>130g</b>

## 5. Test Result

### 5.1 Results-1

Motion Travel distance from 0 to 2.5mm

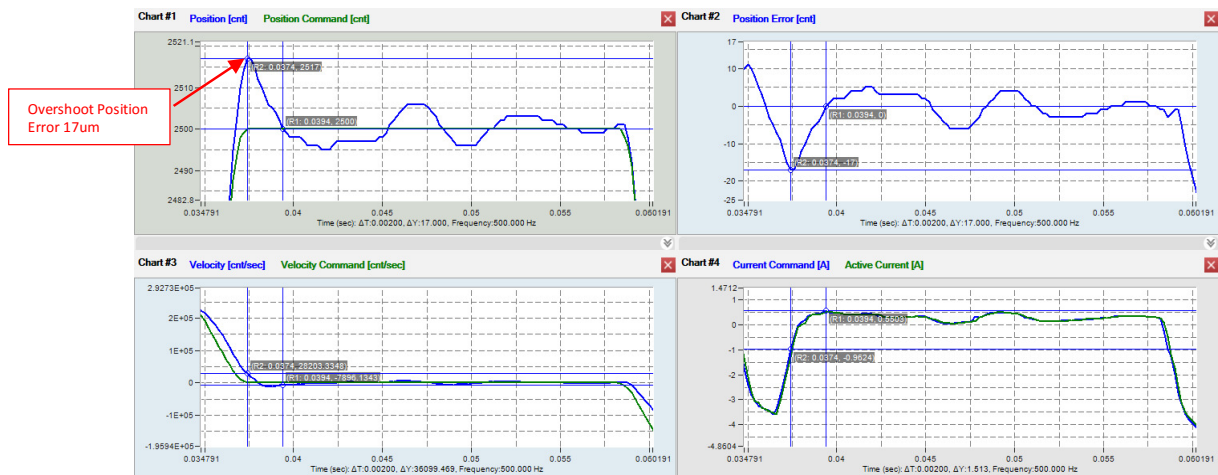
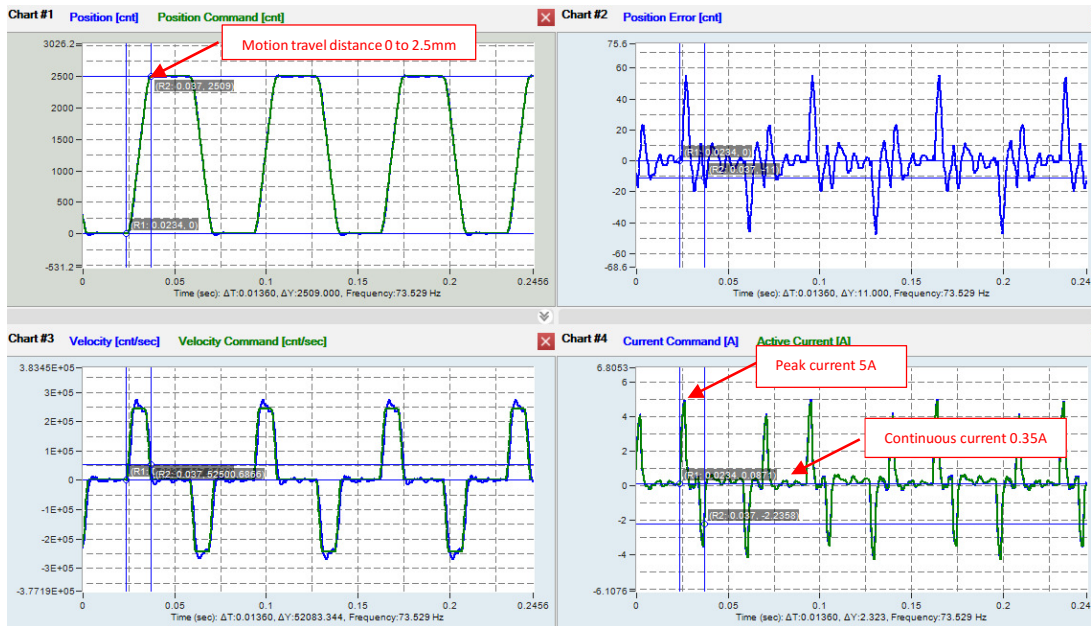


Figure 4 zoom in 2.5mm with 130g load

## Results-2

### Motion Travel distance from 0 to 4mm

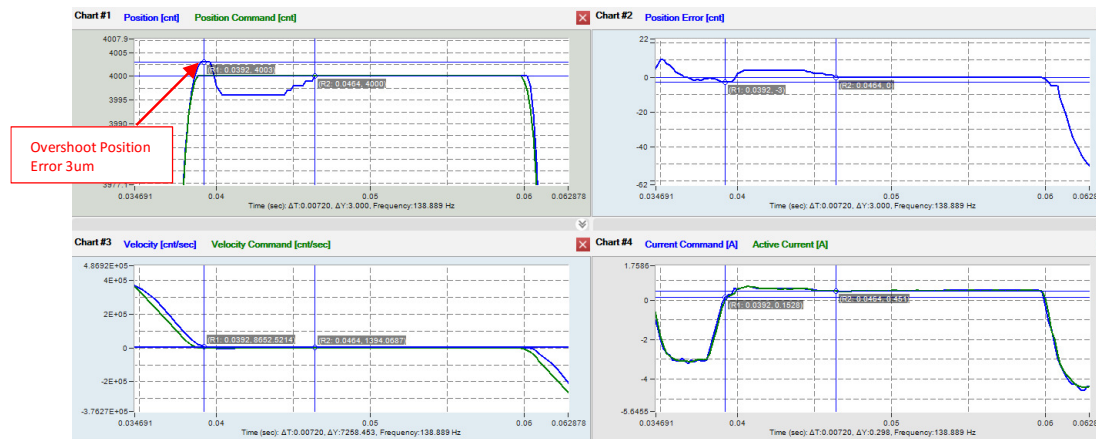
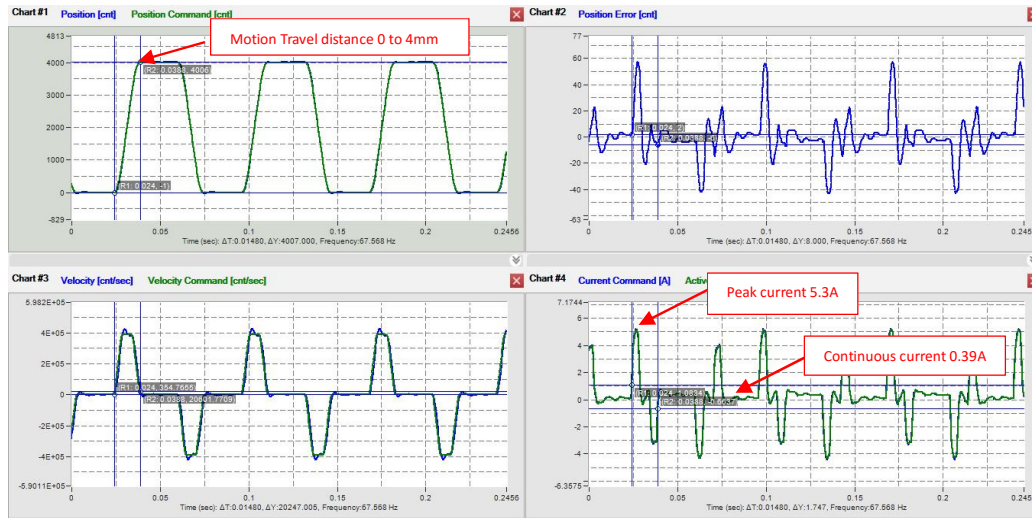


Figure 5 4mm with 130g load

## 5.2 Motion Achieved Results

### First Experiment Result

Travel Distance:	0 to 2.5 mm
Traveling Time + Settling Time:	13.6 msec (spec 0.015sec)
Estimated Continuous current	0.35A
& Peak current	5A



### Second Experiment Result

Travel Distance:	0 to 4 mm
Traveling Time + Settling Time:	14.8 msec ( <b>spec 0.015sec</b> )
Estimated Continuous current	0.39 A
& Peak current	5.3 A

### Motion Profile Setting

Speed:	500000 counts/s
Acceleration:	900000000 counts/s
Deceleration:	900000000 counts/s
Smooth Factor:	10ms

## 5.3 Coil Temperature



Figure 6 Temperature of DGV16

The experiment is conducted at a Room temperature of 28.3 degree. Following are the results of the duration of the temperature recorded.

Time	Temperature in Degree
4.00pm	28.3
4.10pm	33
4.30pm	42
4.40pm	47.5
4.50pm	53.5
5.00pm	58.3
5.10pm	62.5
5.20pm	<b>64.5</b>
5.30pm	<b>64.5</b>

**1 hour 30mins duration**, the temperature settles down at **64.5 degree**





## 6. Summary

Travel Distance (mm)	Total Time (msec)	Customer Requirement
0 to 2.5	14.8	15msec
0 to 4.0	13.0	15msec

Having all test results obtained,

- Able to meet customer's motion profile of 2.5mm and 4mm with load of 130g.
- Able to achieve below 15ms for 2.5mm and 4mm.

## 7. Motor/ Module Information

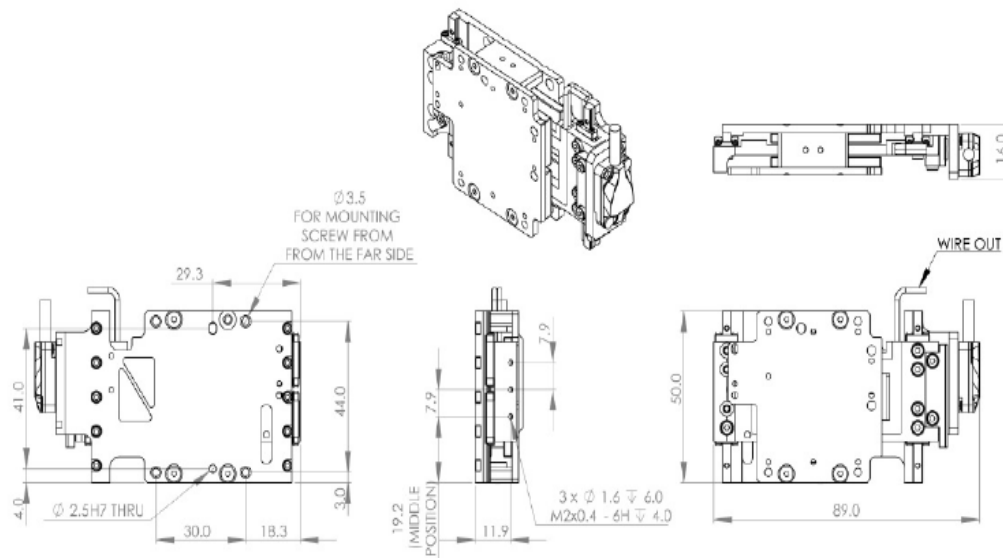
### 7.1 DGV16-AVA1-6-C40 Motor Information / Data Sheet

Model	Units	DGV16-AVA1-6-C40
Stroke	mm	6
Force sensivity (at mid stroke)	N/A	3.43
Back EMF constant	V/m/s	3.43
Continuous force (at 100 °C) <sup>1</sup>	N	6.52
Peak force	N	19.6
Resistance <sup>2</sup>	ohms	1.47
Inductance <sup>2</sup>	mH	TBD
Voltage at peak force	V	24.0
Continuous current (coil at 100 °C)	A	1.9
Peak current	A	5.7
Actuator constant	N/SqRt(W)	2.83
Continuous power (at 100 °C)	W	5.31
Electrical time constant	ms	TBD
Mechanical time constant	ms	4.2
Clearance of coil	mm	0.60
Power at peak force	W	47.8
Thermal dissipation constant	W/°C	0.071
Max coil temperature	°C	155.0
Coil assembly mass	g	33.8
Total assembly mass	g	225.8

1. Continuous force measured without any additional mounting plate or heat sink on coil
2. measured at 25 °C

*Figure 7 Motor datasheet Information*

## 7.2 Dimensional Drawing of DGV16-AVA1



### Multiple pick and place solution

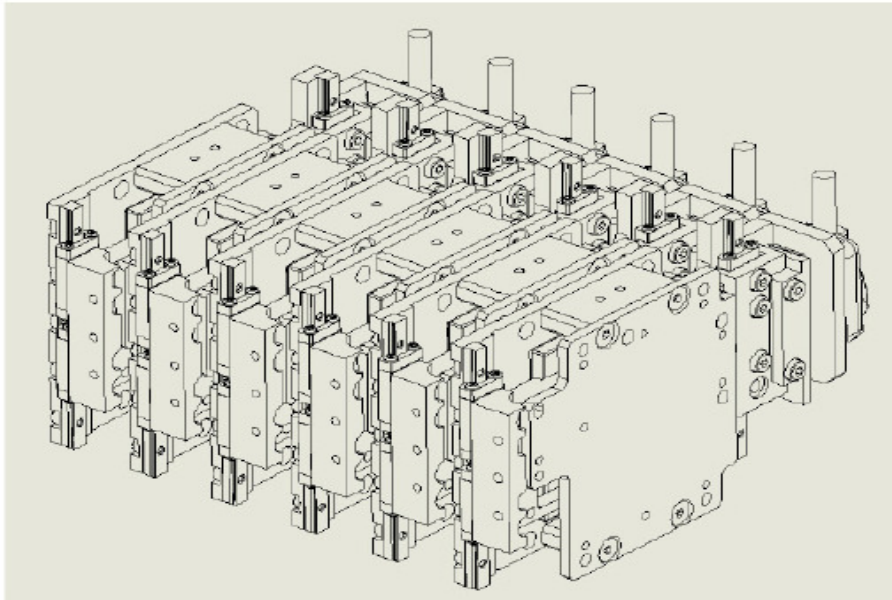


Figure 8 Dimensional Drawing of DGV16